Claims

What is claimed is:

1. A recombinant expression vector comprising a polynucleotide as set forth in SEQ ID NO:15.

2. A host cell transformed or transfected with an expression vector according to claim 1.

3. A method for preparing a sphingosine-1-phosphate lyase, the method comprising culturing a host cell transformed or transfected with a polynucleotide according to claim 1 under conditions promoting expression of the polynucleotide and recovering a sphingosine-1-phosphate lyase.

4. A method for identifying an agent that modulates sphingosine-1-phosphate lyase activity, comprising:

(a) contacting a candidate agent with a polypeptide comprising an amino acid sequence selected from the group consisting of:

(i) an amino acid sequence set forth in SEQ ID NO:16;

(ii) an amino acid sequence having at least 70% identity to a sequence set forth in SEQ ID NO:16; and

(iii) an amino acid sequence having at least 90% identity to a sequence set forth in SEQ ID NO:16;

wherein said polypeptide has sphingosine-1-phosphate lyase activity; and wherein the step of contacting is carried out under conditions and for a time sufficient to allow the candidate agent to interact with said polypeptide; and

(b) subsequently measuring the ability of said polypeptide to degrade sphingosine-1-phosphate or a derivative thereof, relative to an ability in the absence of said candidate agent, and therefrom identifying an agent that modulates sphingosine-1-phosphate lyase activity.

5. A method according to claim 4, wherein the step of contacting is performed by incubating a cell expressing said polypeptide with the candidate agent, and wherein the step of measuring the ability to degrade sphingosine-1-phosphate is performed using an *in vitro* assay and a cellular extract.

6. The method according to claim 5 wherein said cell has been transformed or transfected with an expression vector according to claim 1.

7. A pharmaceutical composition comprising an agent that modulates sphingosine-1-phosphate lyase activity of a polypeptide comprising a sequence set forth in SEQ ID NO:16, in combination with a pharmaceutically acceptable carrier.

8. A composition according to claim 7, wherein the agent comprises a polynucleotide.

9. A composition according to claim 7, wherein the agent comprises an antibody or an antigen-binding fragment thereof that specifically binds a sphingosine phosphate lyase (SPL) polypeptide comprising the sequence set forth in SEQ ID NO:16, and wherein the antibody increases the ability of the SPL polypeptide to degrade sphingosine-1-phosphate.

10. A method for inhibiting the growth of a cancer cell, comprising contacting said cancer cell with an agent that increases sphingosine-1-phosphate lyase activity of a polypeptide comprising a sequence set forth in SEQ ID NO:16.

11. A method according to claim 10, wherein the agent increases expression of an endogenous sphingosine-1-phosphate lyase gene.

12. A method according to claim 11, wherein the agent comprises a polynucleotide set forth in SEQ ID NO:15.

13. A method according to claim 10, wherein the agent is capable of increasing the ability of a polypeptide comprising a sequence as set forth in SEQ ID NO:16 to degrade sphingosine-1-phosphate.

14. A method according to claim 10, wherein the cancer cell is a breast cancer cell.

15. A method for inhibiting the development, metastasis, or development and metastasis of a cancer in a mammal, comprising administering to said mammal an agent that increases sphingosine-1-phosphate lyase activity of a polypeptide comprising a sequence set forth in SEQ ID NO:16.

16. A method according to claim 15, wherein the agent increases expression of an endogenous sphingosine-1-phosphate lyase gene.

17. A method according to claim 15, wherein the agent comprises a polynucleotide set forth in SEQ ID NO:15.

18. A method according to claim 17, wherein the agent is capable of increasing the ability of a polypeptide comprising a sequence set forth in SEQ ID NO:16 to degrade sphingosine-1-phosphate.

19. A method according to claim 15, wherein the agent is linked to a targeting component.

20. A method according to claim 19, wherein the targeting component is an anti-tumor antibody.

21. A method according to claim 19, wherein the targeting component binds to an estrogen receptor.

22. A method according to claim 15, wherein the mammal is afflicted with breast cancer.

23. An antibody or antigen-binding fragment thereof that specifically binds an sphingosine phosphate lyase (SPL) polypeptide comprising the sequence set forth in SEQ ID NO:16, wherein the antibody increases the ability of the SPL polypeptide to degrade sphingosine-1-phosphate.

24. A method for detecting sphingosine-1-phosphate lyase in a sample, comprising:

(a) contacting a sample with an antibody according to claim 23 under conditions and for a time sufficient to allow the antibody to bind to sphingosine-1-phosphate lyase; and

(b) detecting in the sample the presence of sphingosine-1-phosphate lyase bound to the antibody.

25. A kit for detecting sphingosine-1-phosphate lyase in a sample, comprising an antibody according to claim 23 and a buffer and optionally a detection reagent.

26. A homozygous null mutant *Drosophila melanogaster* fly line the genome of which comprises a P-element transposon insertion in the coding region of the sphingosine phosphate lyase (SPL) gene wherein said gene encodes the sequence set forth in SEQ ID NO:16, and wherein said fly line has a flightless phenotype.

27. A method for identifying an agent that modulates sphingosine-1-phosphate lyase activity, comprising:

(a) culturing the mutant flies of claim 26 with growth media supplemented with a candidate agent under conditions and for a time sufficient to observe restoration of flight of at least a proportion of said mutant flies; and

(b) subsequently measuring the restoration of flight in said flies relative to the restoration of flight in the absence of the candidate agent, and therefrom identifying an agent that modulates sphingosine-1-phosphate lyase activity.

28. The method according to claim 27 wherein said homozygous mutant fly line comprises a sphingosine phosphate lyase (SPL) homozygous mutant fly line.

29. The method according to claim 27 wherein said homozygous mutant flies demonstrate abnormal developmental patterning of thoracic muscles of the T2 segment.

30. A method for determining the presence of a cancer in a patient, comprising the steps of:

(a) obtaining a biological sample from the patient;

(b) contacting the biological sample with at least one oligonucleotide that is at least partially complementary to the sequence set forth in SEQ ID NO:7;

(c) detecting in the sample an amount of said oligonucleotide that hybridizes to the polynucleotide; and

(d) comparing the amount of oligonucleotide that hybridizes to the polynucleotide to a predetermined cut-off value, and therefrom determining the presence of the cancer in the patient.